IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re of Applicant	)	
Masayuki Toda et al.	)	Art Group: 1763
Serial No.: 09/381,061	)	Examiner: Beuker, Richard R.
Filing Date: September 10, 1999	)	
Title: SUBSTRATE BODY FLOATING	)	Docket No.: FUK-59
APPARATUS	)	Confirmation No.: 3463
	)	

APPEAL BRIEF

MS: APPEAL
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Appellant hereby submits the instant Appeal Brief in support of the Notice of Appeal to the Board of Patent Appeals and Interferences, involving an appeal from the decision of the Examiner dated October 3, 2003, finally rejecting Claims 1 and 4-9 and objecting to Claims 3 and 10.

REAL PARTY IN INTEREST

The real party in interest of the above-captioned matter is Masayuki Toda et al.

RELATED APPEALS AND INTERFERENCES

None.

STATUS OF CLAIMS

Claims 1 and 3-10 are pending in the instant application. Claims 1 and 4-9 stand rejected, while Claims 3 and 10 stand under objection. The claims involved in the instant appeal are Claims 1 and 3-10, a copy of which is enclosed herewith in the attached Appendix.

STATUS OF AMENDMENTS

The Examiner has indicated that the proposed amendments set forth in Appellant's reply filed April 5, 2004, will not be entered.

SUMMARY OF INVENTION

The subject matter of the invention is directed generally to an apparatus for floating, centering, and rotating a wafer substrate body to facilitate non-contacting support of the wafer during processing. These operations are provided by respective groups of gas-emitting pores individually configured to perform the designated function. The invention, in particular, further includes an arrangement of auxiliary fine pores that are configured to suppress vibration present in the wafer. The inventors have recognized, for example, that high speed rotation of the wafer introduces vibrational movement, which may be exhibited by vibration of the surface body and/or vibration about the central axis of rotation of the wafer. Wafer vibration hinders accurate processing of the substrate body, for example, because it misaligns the wafer with respect to the processing head and impedes uniform processing of the substrate surface. Figs. 1, 4, and 10 show

diagrammatic illustrations of the apparatus, while Fig. 3 depicts illustrative pore arrangements for floating (Fig. 3A), rotation (Fig. 3C), centering (Fig. 3B), and vibration suppression (auxiliary fine pores) (Fig. 3B).

The characteristic type of vibration activity targeted for suppression by the auxiliary fine pores configured for vibration suppression is variously described, for example, at Page 1, lines 1-10; Page 3, lines 3-6; Page 25, line 18 to Page 26, line 4; Page 50, lines 9-12; and the Abstract. (References to the disclosure pertain to the substitute specification included in the filing mailed May 7, 2002, and filed on May 13, 2002, in reply to the Office Action dated November 7, 2001).

According to the invention, the apparatus for floating, centering, and rotating the wafer is adapted to include a distinct and separate arrangement of auxiliary fine pores specially configured to provide vibration suppression. For example, the auxiliary fine pores are provided with a unique, distinctive configuration relative to the other pore types, in terms of location and directionality, which tailors it specifically to the performance of vibration suppression. The use of a unique pore configuration for the auxiliary fine pores enables the auxiliary fine pores to possess a functionality distinct from the other pore groups, namely, vibration suppression versus flotation, rotation, and centering for the other pore groups.

According to one unique and distinctive configuration for the auxiliary fine pores for vibration suppression, all of the auxiliary fine vibration suppression pores are located radially outward of the centering pores and the rotational pores. Additionally, the auxiliary fine vibration

suppression pores have a directionality that is oriented radially towards a center of the floating unit. By comparison, the rotational pores have a directionality that is approximately tangential to a specified circle concentric with the floating-unit center. (See Page 5, lines 17 to Page 6, line 11; Page 6, lines 12-23; Page 18, lines 12-18; Page 19, lines 7-19; and Claims 1, 5-8, and 10). Each pore group is individually operated, for the reason that each pore group has its own separate and distinct functionality. For example, in Figs. 1, 4, 10, and 12, each pore group has its own dedicated gas supply ports shown at 104-105-106-107, 408-a-b-c-d, 1010a-b-c-d, and 1214a-b-c-d, respectively.

The effect of using the auxiliary fine pores for vibration suppression is described in connection with Fig. 8, for example. As shown, the auxiliary gas supply rate (which supplies gas to the auxiliary vibration suppression pores) is increased in proportion to the rotation pore gas supply rate, since increases in the rotation of the wafer cause corresponding increases in the vibration of the wafer that require additional levels of suppression. The operation of the auxiliary fine vibration pores has the effect of suppressing this rotation-induced vibration. (See Page 29, line 9 to Page 30, line 5).

ISSUES

Whether Claims 1, 4-8 and 10 are anticipated under 35 USC § 102 (b) by Hiura, or, in the alternative, unpatentable under 35 USC § 103 (a) over Hiura.

Whether Claims 1, 4-8 and 10 are unpatentable under 35 USC § 103 (a) over Hiura in view of Kisa.

Whether Claim 8 is unpatentable under 35 USC § 103 (a) over Hiura in view of Kisa, and further in view of Bok, Granneman, Aschner, or Maruyama.

Whether Claims 7-9 are unpatentable under 35 USC § 103 (a) over Granneman in view of Hiura, Kisa and Foster.

Whether Claim 9 is unpatentable under 35 USC § 103 (a) over Granneman in view of Hiura, Kisa and Foster, and further in view of Nishitani and White.

Whether Claims 7 and 9 are anticipated under 35 USC § 102 (e) by Aschner or Maruyama, or, in the alternative, unpatentable under 35 USC § 103 (a) over Aschner or Maruyama.

Whether Claims 7-9 are unpatentable under 35 USC § 103 (a) over either Aschner or Maruyama, and in further view of Kisa.

Whether Claim 3 is objected to as being dependent upon a rejected base claim.

Whether Claim 10 is objected to as being dependent upon a rejected base claim.

GROUPING OF CLAIMS

The claims of the first group consisting of Claims 1, 4-8 and 10 do not stand or fall together.

Appellant considers the subgroup of Claims 1, 4, and 5 to stand or fall together and to be separately patentable from the other claims of this group.

Appellant considers Claim 6 to be separately patentable from the other claims of this group.

Appellant considers Claim 7 to be separately patentable from the other claims of this group.

Appellant considers Claim 8 to be separately patentable from the other claims of this group.

Appellant considers Claim 10 to be separately patentable from the other claims of this group.

The claims of the second group consisting of Claims 1, 4-8 and 10 do not stand or fall together.

Appellant considers the subgroup of Claims 1, 4, and 5 to stand or fall together and to be separately patentable from the other claims of this group.

Appellant considers Claim 6 to be separately patentable from the other claims of this group.

Appellant considers Claim 7 to be separately patentable from the other claims of this group.

Appellant considers Claim 8 to be separately patentable from the other claims of this group.

Appellant considers Claim 10 to be separately patentable from the other claims of this group.

The claims of the first group consisting of Claims 7-9 do not stand or fall together.

Appellant considers Claim 7 to be separately patentable from the other claims of this group.

Appellant considers Claims 8 and 9 to stand or fall together and to be separately patentable from the other claims of this group.

The claims of the group consisting of Claims 7-8 do not stand or fall together.

Appellant considers Claim 7 to be separately patentable from the other claims of this group.

Appellant considers Claim 8 to be separately patentable from the other claims of this group.

The claims of the second group consisting of Claims 7-9 do not stand or fall together.

Appellant considers Claim 7 to be separately patentable from the other claims of this group.

Appellant considers Claims 8 and 9 to stand or fall together and to be separately patentable from the other claims of this group.

ARGUMENT

SUMMARY

The prior art rejections are all based (in part) upon an inherency argument applied to the claim limitations variously directed to the recited auxiliary fine vibration suppression pores. None of the cited prior art expressly or implicitly discloses such vibration suppression pores, as the Examiner notes. Nevertheless, the Examiner construes certain cited passages in the specification as admissions allegedly stating that rotation pores and/or centering pores also inherently perform vibration suppression, in addition to their designated functions. However, the Examiner has entirely misconstrued and therefore misapplied the cited passages from the specification. The original disclosure provides no basis for the inherency argument made by the Examiner. In particular, the Examiner's belief that the specification describes an inherent multi-function capability for the rotation pores (rotation and vibration suppression) and the centering pores (centering and vibration suppression) is incorrect and not found in the specification. Accordingly, since the inherency argument is incorrect and unsupportable, and the Examiner relies solely and exclusively upon the inherency argument to find that the cited art purportedly discloses the claim limitations variously directed to vibration suppression pores, all of the rejections are improper.

I. OVERVIEW AND ANALYSIS OF REJECTIONS AS A WHOLE

The following is a general discussion of the various rejections, considered in total, in order to simplify a review of the inherency argument that the Examiner applies in substantially the same form in each rejection.

For inherency to apply, the cited art must necessarily teach the indicated subject matter; the purported presence of the feature in the cited art cannot simply be a possibility or a probability. *MPEP* §2112, §2131.01. In particular, inherency cannot be established by mere probabilities or possibilities regarding the presence of the missing descriptive matter; the missing element must be necessarily present in the cited prior art disclosure.

Claims 1, 7, and 8 are independent.

The base claims recite, *inter alia*, "a plurality of auxiliary fine suppression pores configured for suppressing vibration of the substrate body when the substrate body is rotated at a high speed" (Claim 1); "a plurality of vibration suppression pores" (Claim 7); and "a plurality of vibration suppression pores" (Claim 8). None of the cited art expressly or implicitly discloses either the problem of vibration or pores directed to the suppression of vibration, as acknowledged by the Examiner. Rather, according to the rejection, the manner in which the cited art purportedly teaches the foregoing limitations is predicated solely and entirely upon an inherency argument, which is turn is based on the Examiner's construction of certain statements in the specification.

In particular, the Examiner construes certain passages in the specification as admissions by Appellant allegedly indicating that the functionality of certain pores (rotation and centering) also encompasses vibration suppression. Based upon this construction, the Examiner reasons as follows: since the specification states (purportedly) that the rotation pores and/or centering pores can also provide vibration suppression, and the cited art discloses such rotational and/or centering pore types, then the pores disclosed by the cited art must also inherently function as vibration suppression pores.

However, the reasoning of the Examiner is faulty and incorrect. As discussed further, the Examiner has mischaracterized and therefore misapplied the referenced text found in the specification. None of the flotation pores, rotation pores, or centering pores inherently functions to perform vibration suppression. The specification does not as the Examiner suggests provide any basis for the inherency argument proposed by the Examiner in formulating the rejections. Notably, the determination of inherency made by the Examiner is essential to every rejection and serves as the sole and exclusive foundation for the Examiner's position that the cited art teaches the various claim limitations directed to vibration suppression pores. Accordingly, since the inherency argument is incorrect, each rejection is improper.

Unless otherwise noted, all references to the application refer to the substitute specification included in the filing mailed May 7, 2002 (and filed May 13, 2002), in reply to the Office Action dated November 7, 2001.

Regarding the foregoing claim limitations concerning vibration suppression pores, the Examiner states as follows in relevant part (emphasis added):

> Hiura does not disclose that his substrate vibrates during rotation, and there is no other indication that his substrate vibrates, so it is reasonable and proper to assume that his gas distribution holes inherently do no cause any excessive vibration. (Paper No. 9, Office Action dated November 7, 2001, page 6).
>
> There is no disclosure that the substrate of Aschner is vibrating in any excessive way, so is reasonable and proper to assume that his gas distribution holes inherently do not cause any excessive vibration. It is also noted that applicants' specification at page 2, lines 12-14, indicates that a purpose of their invention is to avoid vibration due to the presence of a rotary shaft. It is noted that Aschner's substrate rotates without a rotary shaft. (Paper No. 9, Office Action dated November 7, 2001, page 6).
>
> Applicants have argued that Hiura does not disclose one or more fine pores for suppressing vibration when the substrate is rotated at high speed. <u>It is noted, however, that applicants' specification at page 6, lines 3-6 states that raising the rotational speed of a substrate body will suppress vibrations.</u> Since Hiura (see abstract and Fig. 2) discloses the use of one or more fine pores for rotating the substrate, and applicants make clear that increasing the rotating speed will have the effect of suppressing vibration, Hiura's fine pores for rotating have an inherent capability to suppress vibration, when the gas flow rate from these fines pores is started and/or increase. (Paper No. 12, Office Action dated July 31, 2002, page 4).
>
> Also, <u>applicants' specification at page 5, lines 14-16, states that centering gas from fine pores for centering can also have the intended effect of reducing vibrations</u>. Since Hiura ... discloses the use of one or more fine pores for centering the substrate, and <u>applicants make clear that centering gas will have the effect of suppressing vibration</u>, Hiura's fine pores for centering have an inherent capability to suppress vibration, when the gas flow rate from these fines pores is started and/or increased. (Paper No. 12, Office Action dated July 31, 2002, pages 4-5).
>
> Applicants have argued that the rejections based on Bhat, Maruyama and Amada should be removed because they do not teach a floating means for suppressing

vibrations as now recited in claim 8. It is noted, however, that applicants' specification at page 6, lines 3-6 states that raising the rotational speed of a substrate body will suppress vibrations. Since these references all disclose the use of one or more fine pores for rotating the substrate, and applicants make clear that increasing the rotating speed will have the effect of suppressing vibration, the fine pores of for rotating of Bhat, Maruyama and Amada have an inherent capability to suppress vibration ... (Paper No. 12, Office Action dated July 31, 2002, pages 5-6).

A group of fine pores can perform more than one function. For example, the rotation pores and centering pores of Hiura also can have a flotation function. It is noted in particular that applicants' specification (see the last sentence of page 6, for example) indicates that vibration is suppressed by rotation of the substrate, and therefore "a plurality of fine rotational pores configured for rotating the substrate body" as recited in claim 1 can also be considered to inherently be "a plurality of auxiliary fine suppression pores configured for suppressing vibration of the substrate body when the substrate body is rotated at high speed" as also recited in claim 1. (Paper No. 19, Office Action dated March 13, 2003, Page 5).

It is noted again that applicants' specification indicates that wafer rotation reduces vibration, and thus an extra set of rotation pores, as illustrated by Kisa, would inherently function as vibration suppression pores. (Paper No. 19, Office Action dated March 13, 2003, Page 6).

Regarding the function of suppressing vibration, it is noted that vibrations is inherently suppressed by rotation, and therefore the gas ejection pores of Aschner and Maruyama also inherently perform the function of suppressing vibration. (Paper No. 19, Office Action dated March 13, 2003, Pages 7-8).

It is noted again that applicants' specification indicates that wafer rotation reduces vibration, and thus an extra set of rotation pores, as illustrated by Kisa, would inherently function as vibration suppression pores. (Paper No. 19, Office Action dated March 13, 2003, Page 8).

Also, applicants' specification (see the last sentence of page 6, for example) indicates that vibration is suppressed by rotation of the substrate, and therefore "a plurality of fine rotational pores configured for rotating the substrate body" as recited in claim 1 can also be considered to inherently be "a plurality of auxiliary

> fine suppression pores configured for suppressing vibration of the substrate body when the substrate body is rotated at high speed" as also recited in claim 1. (Paper No. 22, Final Office Action dated October 3, 2003, Pages 3-4).
>
> It is noted again that applicants' specification indicates that rotation inherently suppresses vibration. (Paper No. 22, Final Office Action dated October 3, 2003, Page 4).

Contrary to the assertions made by the Examiner, neither the centering pores nor the rotation pores inherently possess a functionality to suppress vibration of the substrate body. The Examiner has misconstrued the specification to support the finding of inherency. Regarding the numerous passages cited and relied upon by the Examiner in forming the inherency arguments, a full reading of the entire specification reveals that the meaning and interpretation ascribed to these passages by the Examiner is incorrect (as discussed further below).

The referenced portions of the specification identified by and relied upon by the Examiner in formulating the inherency arguments are reproduced below:

> Also vibration of a surface of a substrate body or inclination of a substrate body can be suppressed when the substrate body is rotated. (Page 6, lines 21-23).
>
> By raising a rotational speed of the substrate body, vibration of a surface of a substrate body and inclination of the substrate body can be reduced. (Page 6, lines 3-6).
>
> ... it is possible to suppress vibration of a substrate body in the horizontal direction to about 5 mm or less at a given floating height by correctly controlling a centering gas supply rate. (Page 5, lines 13-16).
>
> With the features as described above, the substrate body-floating apparatus according to the present invention can float and rotate a substrate body without

> vibration of the rotary shaft on a center line of the floating unit and also can suppress vibration of a surface of the substrate body due to rotation. (Original disclosure, Page 2, lines 11-15).

As discussed below, each of the foregoing statements from the specification relied upon by the Examiner will be addressed individually. When portions of the specification are reproduced, the statement referenced by the Examiner will be highlighted with italics, where applicable.

Regarding the cited passage found at Page 6, lines 21-23, pertaining to rotation of the substrate body, the full context of the statement reads as follows in pertinent part (emphasis added):

> With the features as described above, the <u>auxiliary fine pores</u> are provided on a surface of the floating unit, and further <u>fine pores are oriented to a center of the floating unit</u> on a circle with a larger radius as compared to that of the floating unit at an angular space of 90 degrees therebetween in the outer side from the positions of the fine pores for rotation, so that, when a substrate body is rotated and a rotational speed of the substrate body is raised, the substrate body is prevented from jumping out from the floating apparatus (namely from the floating unit). *Also vibration of a surface of a substrate body or inclination of a substrate body can be suppressed when the substrate body is rotated.* (Page 6, lines 12-23).

Immediately at the outset of this paragraph, it is evident that the subject of the ensuing text strictly concerns the auxiliary fine pores configured for vibration suppression, not the functionality of rotation pores. The stated "further fine pores" also refers to such auxiliary fine pores. Accordingly, the last sentence relied upon by the Examiner should not be understood as meaning that vibration can be suppressed by mere rotation of the substrate body, i.e., by operation of the rotation pores; rather, in view of the totality of the passage, this sentence is stating that when the

substrate body is rotated, vibration suppression occurs by the functionality of the as-discussed auxiliary fine pores. Accordingly, this referenced statement cannot be relied upon in the manner offered by the Examiner to conclude that rotation pores inherently provide vibration suppression. (The prevention of the stated "jumping out" refers as well to vibration suppression, as accomplished by the auxiliary fine pores. It is apparent throughout the specification that references to auxiliary fine pores corresponds to the pores configured for vibration suppression.)

Regarding the cited passage found at Page 6, lines 3-6, pertaining to raising the rotational speed of the substrate body, the specification elsewhere reads as follows in pertinent part (emphasis added):

> (Embodiment 3)
> In this embodiment, a relation between a gas supply rate Rf under atmospheric pressure and a rotational speed Rn of a substrate body was checked by using the substrate body-floating apparatus shown in Fig. 1 ... In this step, the floating gas supply rate Ff was set to 15.5 1/min, centering gas supply rate Cf to 4.0 1/min, a rotation gas supply rate Rf to 0 to 20 1/min, and auxiliary gas supply rate Hf to O to 20 1/min. ...
> A substrate body was placed on a floating unit and was floated and maintained in the floating state by supplying a floating gas and a centering gas. After movement of the substrate body was substantially stabilized, a supply rate of rotation gas was gradually increased to obtain the rotational speed, ... A supply rate of auxiliary gas was increased in proportion to a rotational speed of the substrate body so that the substrate body would be stabilized. ...
> ... Fig. 8 is a graph showing an auxiliary gas supply rate associated with a rotation gas supply rate. ...
> Also it was understood from a result of measurement of a supply rate Hf of auxiliary gas fed to prevent the substrate body from jumping out of the floating unit when the rotational speed becomes higher (See Fig. 8) that a supply rate of auxiliary gas to be supplied increases in association with an increase of a rotational

speed of a substrate body. (Page 28, line 1 to Page 29, line 7).

When viewed in context based on the totality of the specification, it is evident that the passage found at Page 6, lines 3-6, cited by the Examiner should be understood as meaning that the vibration reduction occurs not by operation of the rotation pores as the Examiner suggests, but by operation of the auxiliary (vibration suppression) pores. In particular, as the foregoing text explains, the vibration suppress pores (and not the rotation or centering pores) are fed with an auxiliary gas supply whose rate is made to increase commensurate with the rotational pore gas rate in order to suppress the vibration that accompanies higher rotational speeds of the substrate body. This vibration suppression by the auxiliary pores is described in terms of the stabilization of the substrate body and preventing the body from jumping out of the floating unit.

Accordingly, the cited passage ("By raising a rotational speed of the substrate body, vibration of a surface of a substrate body and inclination of the substrate body can be reduced") does not mean that the rotation pores can effectuate vibration suppression by imparting increased rotational motion to the substrate body. Notably, it is the increase in the rotational speed of the substrate that causes, not suppresses, the vibration. According to Embodiment 3 of the invention, as the rotational speed of the substrate body is increased, this mode of operation (increased rotational speed) is preferably accompanied by the use of auxiliary (vibration suppression) pores whose auxiliary gas supply rate is likewise

increased to compensate for the rotation-induced vibration. (See Fig. 8). Accordingly, the referenced statement from the specification cannot be relied upon in the manner offered by the Examiner to conclude that rotation pores inherently provide vibration suppression.

As to the particular effect of managing the rotational speed of the substrate body, the specification elsewhere reads as follows in pertinent part (emphasis and insertion added):

> (Embodiment 4)
> ...
> Fig. 9 is a graph showing dependency of a floating height, inclination, and displacement in the horizontal direction of a substrate body.
> From Fig. 9, it was understood that, when the rotation gas supply rate Rf was increased, namely <u>when a rotational speed of a substrate body was raised, both inclination and displacement in the horizontal direction of a substrate body are reduced</u>. Even if the rotation gas supply rate Rf is substantially increased, deviation of a substrate body [floating height – Fig. 9A] is little affected. Accordingly, it was confirmed that <u>inclination and displacement in the horizontal direction of a substrate body can be suppressed by adjusting a rotational speed of the substrate body</u>. (Page 30, line 6 to Page 31, line 9).

In view of the foregoing text, it is apparent that the stated suppression refers not to vibration, but to changes in the horizontal displacement and inclination of the wafer that result from making adjustments to the rotational speed via control of the rotation pore gas supply rate. Again, it is clear that the specification cannot support the position that the rotation pores can inherently function as vibration suppression pores.

Regarding the cited passage found at Page 5, lines 13-16, pertaining to operation of the

centering pores, the specification elsewhere reads as follows in pertinent part (emphasis added):

> (Embodiment 2)
> In this embodiment, a floating performance of a substrate body under an atmospheric pressure was examined by using the substrate body-floating apparatus shown in Fig. 1 and changing a supply rate of gas sent through fine pores for centering the floating unit 101. ...
> Fig. 6 is a graph showing dependency of a floating height, inclination, and displacement in the horizontal direction of a substrate body on a centering gas supply rate.
> From Fig. 6 it is understood that, <u>when a centering gas supply rate Cf is changed in a state where a substrate body is floating</u>, a floating height of the substrate body is little affected with inclination of the substrate body becoming larger, but that <u>displacement of the substrate body in the horizontal direction can largely be reduced</u>. <u>When a centering gas supply rate is excessive, displacement of the substrate body increased proportionately</u>. (Page 26, line 16 to Page 27, line 17).

When viewed in context based on the totality of the specification, it is evident that the passage found at Page 5, lines 13-16, cited by the Examiner may be misleading in its use of the terminology "suppression vibration" in relation to the centering pores. The foregoing text, however, provides the proper context for understanding this statement and the operation of the centering pores. In particular, according to Embodiment 2 of the invention (Fig. 6C), it is seen that controlling the gas supply rate administered to the centering pores has the effect of managing the horizontal displacement of the wafer structure, not achieving any vibration suppression.

Accordingly, the cited passage ("it is possible to suppress vibration of a substrate body in the horizontal direction to about 5 mm or less at a given floating height by correctly controlling a centering gas supply rate") does not mean that the centering pores can

effectuate vibration suppression as the Examiner suggests. Rather, the centering pores can be used to actuate horizontal displacement of the substrate body, not to implement vibration suppression. Accordingly, the referenced statement from the specification cannot be relied upon in the manner offered by the Examiner to conclude that centering pores inherently provide vibration suppression.

Although not cited by the Examiner, the specification further reads as follows:

> … inclination of the substrate body can be suppressed to about 5 X 10^{-3} rad or less with vibration of the substrate body in the horizontal direction controlled to 10 mm or below by correctly adjusting a floating gas supply rate. (Page 5, lines 3-7).

Again, use of the terms "suppressed" and "vibration" may be misleading to the extent that it may seem to imply that adjusting the floating gas supply rate can control vibration suppression. Regarding this passage, the specification elsewhere reads as follows in relevant part (emphasis added):

> (Embodiment 1)
> In this embodiment, the substrate body-floating apparatus shown in Fig. 1 is used, and a substrate body-floating performance under atmospheric pressure was examined by <u>changing a supply rate of gas flowing through the fine pores for floating</u> (Fig. 3A) of the four fine pore groups (See Fig. 3A to Fig. 3B) constituting the floating unit 101. …
> Fig. 5 is a graph showing dependency of a floating height, inclination, and displacement in the horizontal direction of a substrate body on a floating gas supply rate.
> From Fig. 5, it can be confirmed that the substrate body was floated when the floating gas supply rate Ff is 3.6 1/min or more, and that, when the floating gas supply rate is higher than the value above, a floating height of a substrate body can be controlled in proportion to a floating gas supply rate. Also it was understood that,

> <u>as a floating gas supply rate increases, displacement of the substrate body in the horizontal direction becomes smaller but inclination thereof becomes larger</u>. (Page 23, line 15 to Page 26, line 15).

When viewed in context based on the totality of the specification, it is evident that the passage found at Page 5, lines 3-7, cannot be understood to mean that the flotation pores can be used for vibration suppression. Rather, the foregoing text provides the proper context for understanding this statement concerning operation of the flotation pores as a function of gas supply rate. In particular, according to Embodiment 1 of the invention (Fig. 5C), it is seen that controlling the gas supply rate administered to the flotation pores has the effect of managing the horizontal displacement of the wafer structure, not achieving any vibration suppression. Accordingly, the terms "suppressed" and "vibration" in the foregoing passage should not be construed to encompass vibration suppression, but to refer to the effect that changing the floating pore gas supply rate has on inclination (Fig. 5B) and horizontal displacement (Fig. 5C). The characteristic type of vibration activity targeted for suppression by the auxiliary fine pores configured for vibration suppression is variously described, for example, at Page 1, lines 1-10; Page 3, lines 3-6; Page 25, line 18 to Page 26, line 4; Page 50, lines 9-12; and the Abstract.

Regarding the cited passage found at Page 2, lines 11-15 (original disclosure), the full context of the specification reads as follows in pertinent part (emphasis added):

> A substrate body-floating apparatus according to the present invention is a substrate body-floating apparatus for blowing an air flow to a rear surface of a disk-shaped substrate body to float and rotate the substrate body, and has a floating

> unit comprising ... a group of auxiliary fine pores for suppressing vibration when the substrate body is rotated at a high speed. *With the features as described above, the substrate body-floating apparatus according to the present invention can float and rotate a substrate body without vibration of the rotary shaft on a center line of the floating unit and also can suppress vibration of a surface of the substrate body due to rotation.* As a result, the substrate body-floating apparatus according to the present invention can maintain a substrate body in a stable rotating state in which the substrate body contacts nothing other than air flow.

The statement in the cited passage referring to vibration suppression ("can suppress vibration of a surface of the substrate body due to rotation") clearly conveys the understanding that rotation of the substrate body causes – and not suppresses – vibration. The group of auxiliary fine pores are provided to suppress the vibration that is induced in the substrate body by high rotational speeds. Thus, as mentioned previously, operation of the rotation pores does not suppress, but causes, the vibration that is specifically addressed by the concurrent operation of the auxiliary fine pores.

The statement "without vibration of the rotary shaft" in the foregoing text refers to a structure of the body-floating apparatus, not an element of the substrate body. One advantage of the invention is that there is no need for any support structure to physically couple the body-floating apparatus to the wafer substrate body, since the apparatus is configured to non-contactably maintain the substrate body in a floating state by use of the appropriate air flow currents. (See Fig. 4). Regarding vibration of the substrate body itself, the specification reads as

follows in pertinent part concerning the advantages that the invention endeavors to achieve, specifically with the auxiliary fine pores (emphasis added):

> As described above, with the present invention, a substrate body-floating apparatus which can realize a floating state of a substrate body with less vibration of the rotation axis or a surface thereof can be obtained. (Page 50, lines 9-12).
>
> It is an object of the present invention to provide a substrate body-floating apparatus which insures a stable floating state of a substrate body with less vibration of a rotation axis or a surface thereof ... (Abstract, lines 1-4).
>
> More specifically the present invention relates to a substrate body-floating apparatus capable of realizing a stable floating state with less vibration of a rotation axis. (Page 1, lines 3-6).

In view of the foregoing passages, it is seen that the invention aims (at least in part) to suppress vibration of the substrate body, which may manifest as vibration of the wafer surface and/or vibration of the wafer body about its rotational axis.

It is notable that the specification always considers the structure and functionality of each type of pore group separately, individually, and distinctly (i.e., the distinct pore groups for flotation, rotation, centering, and vibration suppression). Nowhere does the specification describe any shared, joint, or commingled functionality among the distinct pore groups, much less that the centering pores and/or rotational pores also inherently function to provide vibration suppression. The manner in which the specification consistently draws this distinction among the different pore groups, especially as regards to their respective functionalities, further reinforces Appellant's position that the specification does not support the inherency argument made by the Examiner.

For example, the auxiliary fine pores are provided with a unique, distinctive configuration relative to the other pore types, in terms of location and directionality, which tailors it specifically to the performance of vibration suppression. It is believed that the use of a unique pore configuration for the auxiliary fine pores is ample evidence that the auxiliary fine pores have a functionality distinct from the other pore groups, namely, vibration suppression. (Claims 1, 6, 7, 8, and 10 recite subject matter relating to this unique distinctiveness concerning the position and directionality of the vibration suppression pores).

The specification provides examples of the unique and distinctive configuration for the auxiliary fine pores for vibration suppression. For example, in one form, all of the auxiliary fine vibration suppression pores are located radially outward of the centering pores and the rotational pores. Additionally, the auxiliary fine vibration suppression pores have a directionality that is oriented radially towards a center of the floating unit. By comparison, the rotational pores have a directionality that is approximately tangential to a specified circle concentric with the floating-unit center. (See Page 5, lines 17 to Page 6, line 11; Page 6, lines 12-23; Page 18, lines 12-18; Page 19, lines 7-19; and Claims 1, 5-8, and 10). Additionally, the specification consistently describes the individual operation of each pore group, clearly for the reason that each pore group has its own separate and distinct functionality. For example, in Figs. 1, 4, 10, and 12, each pore group has its own dedicated gas supply ports shown at 104-105-106-107, 408-a-b-c-d, 1010a-b-c-d, and 1214a-b-c-d, respectively.

In sum, since each rejection depends on an inherency argument predicated entirely on an erroneous construction of the specification, the inherency argument is incorrect, which necessarily defeats all of the rejections.

II. INDIVIDUAL GROUNDS FOR REJECTION

As stated in the Final Office Action dated October 3, 2003, the rationale for each claim rejection corresponds to "the reasons stated in the previous office action", namely, the Office Action dated March 13, 2003. Accordingly, in the discussion below, unless otherwise indicated, the referenced statements and positions of the Examiner are found in the Office Action dated March 13, 2003.

A. Rejection of Claims 1, 4-8 and 10 under 35 U.S.C. §102 (b) or §103(a) Over Hiura

Regarding the limitation in Claim 1 directed to "a plurality of auxiliary fine suppression pores configured for suppressing vibration of the substrate body when the substrate body is rotated at a high speed", the Examiner states that this limitation is satisfied by the rotation pores of Hiura based on the inherency argument discussed above. (Office Action, Page 5).

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection as applied to Claim 1 and Claims 4 and 5 dependent therefrom.

Regarding the limitation in base Claim 7 directed to "a plurality of vibration suppression pores", the Examiner states that this limitation is satisfied by the rotation pores of Hiura based on the inherency argument discussed above. (Office Action, Page 5).

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection as applied to Claim 7.

Regarding the limitation in base Claim 8 directed to "a plurality of vibration suppression pores", the Examiner states that this limitation is satisfied by the rotation pores of Hiura based on the inherency argument discussed above. (Office Action, Page 5).

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection as applied to Claim 8.

Regarding the recitations in Claim 6 directed to the auxiliary fine suppression pores, the Examiner relies upon the inherency argument discussed above, as applied to Claim 1 from which Claim 6 depends.

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection as applied to Claim 6.

Regarding the recitations in Claim 10 directed to the auxiliary fine suppression pores, the Examiner relies upon the inherency argument discussed above, as applied to Claim 1 from which Claim 10 depends.

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection as applied to Claim 10.

Regarding further base Claims 1, 7 and 8, it is also not seen that the cited art teaches or suggests the respective limitations directed to "the relative positioning and the directionality of a particular pore type being unique to that said particular pore type with respect to others of said pore types" (Claim 1); "the relative positioning and the directionality associated with a particular pore type being unique to that said particular pore type with respect to others of said pore types" (Claim 7); and "the relative positioning and the directionality associated with a particular pore type being unique to that said particular pore type with respect to others of said pore types" (Claim 8), as it pertains to a pore arrangement involving auxiliary fine (vibration) suppression pores.

B. <u>Rejection of Claims 1, 4-8 and 10 under 35 U.S.C. §103(a) Over Hiura in view of Kisa</u>

Regarding the limitation in Claim 1 directed to "a plurality of auxiliary fine suppression pores configured for suppressing vibration of the substrate body when the substrate body is rotated

at a high speed", the Examiner states that this limitation is satisfied by the rotation pores of Kisa based on the inherency argument discussed above. (Office Action, Page 6).

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection as applied to Claim 1 and Claims 4 and 5 dependent therefrom.

Regarding the limitation in base Claim 7 directed to "a plurality of vibration suppression pores", the Examiner states that this limitation is satisfied by the rotation pores of Kisa based on the inherency argument discussed above. (Office Action, Page 6).

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection as applied to Claim 7.

Regarding the limitation in base Claim 8 directed to "a plurality of vibration suppression pores", the Examiner states that this limitation is satisfied by the rotation pores of Kisa based on the inherency argument discussed above. (Office Action, Page 6).

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection as applied to Claim 8.

Regarding the recitations in Claim 6 directed to the auxiliary fine suppression pores, the Examiner relies upon the inherency argument discussed above, as applied to Claim 1 from which Claim 6 depends.

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection as applied to Claim 6.

Regarding the recitations in Claim 10 directed to the auxiliary fine suppression pores, the Examiner relies upon the inherency argument discussed above, as applied to Claim 1 from which Claim 10 depends.

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection as applied to Claim 10.

Regarding further base Claims 1, 7 and 8, it is also not seen that the cited art teaches or suggests the respective limitations directed to "the relative positioning and the directionality of a particular pore type being unique to that said particular pore type with respect to others of said pore types" (Claim 1); "the relative positioning and the directionality associated with a particular pore type being unique to that said particular pore type with respect to others of said pore types" (Claim 7); and "the relative positioning and the directionality associated with a particular pore

type being unique to that said particular pore type with respect to others of said pore types" (Claim 8), as it pertains to an arrangement involving auxiliary fine (vibration) suppression pores.

C. Rejection of Claim 8 under 35 U.S.C. §103(a) Over Hiura in view of Kisa, Bok, Granneman, Aschner, or Maruyama

Regarding the limitation in base Claim 8 directed to "a plurality of vibration suppression pores", the Examiner states that this limitation is satisfied by the rotation pores of Kisa and/or Hiura based on the inherency argument discussed above. (Office Action, Pages 6-7).

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection.

Regarding further base Claim 8, it is also not seen that the cited art teaches or suggests the limitation directed to "the relative positioning and the directionality associated with a particular pore type being unique to that said particular pore type with respect to others of said pore types", as it pertains to an arrangement involving floatation pores, rotational pores, and vibration suppression pores.

D. Rejection of Claims 7-9 under 35 U.S.C. §103(a) Over Granneman in view of Hiura, Kisa and Foster

Regarding the limitation in base Claim 7 directed to "a plurality of vibration suppression pores", the Examiner states that this limitation is satisfied by the rotation pores of Kisa and/or Hiura based on the inherency argument discussed above. (Office Action, Page 7).

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection as applied to Claim 7.

Regarding the limitation in base Claim 8 directed to "a plurality of vibration suppression pores", the Examiner states that this limitation is satisfied by the rotation pores of Kisa and/or Hiura based on the inherency argument discussed above. (Office Action, Page 7).

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection as applied to Claim 8 and Claim 9 dependent therefrom.

Regarding further base Claims 7 and 8, it is also not seen that the cited art teaches or suggests the limitations therein directed to "the relative positioning and the directionality associated with a particular pore type being unique to that said particular pore type with respect to others of said pore types", as it pertains to an arrangement involving floatation pores, rotational pores, and vibration suppression pores.

E. Rejection of Claim 9 under 35 U.S.C. §103(a)
Over Granneman in view of Hiura, Kisa, Foster, Nishitani, and White

Appellant requests reversal of this rejection, as Claim 9 depends from patentably distinguishable base Claim 8, as discussed above.

F. Rejection of Claims 7 and 8 under 35 U.S.C. §102 (e) or §103(a) Over Aschner or Maruyama

Regarding the limitation in base Claim 7 directed to "a plurality of vibration suppression pores", the Examiner states that this limitation is satisfied by the pores of Aschner and/or Maruyama based on the inherency argument discussed above. (Office Action, Page 7).

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection as applied to Claim 7.

Regarding the limitation in base Claim 8 directed to "a plurality of vibration suppression pores", the Examiner states that this limitation is satisfied by the pores of Aschner and/or Maruyama based on the inherency argument discussed above. (Office Action, Page 7).

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection as applied to Claim 8.

Regarding further base Claims 7 and 8, it is also not seen that the cited art teaches or suggests the limitations therein directed to "the relative positioning and the directionality associated with a particular pore type being unique to that said particular pore type with respect to others of said pore types", as it pertains to an arrangement involving floatation pores, rotational pores, and vibration suppression pores.

G. Rejection of Claims 7-9 under 35 U.S.C. §103(a) Over Aschner or Maruyama, in view of Kisa

Regarding the limitation in base Claim 7 directed to "a plurality of vibration suppression pores", the Examiner states that this limitation is satisfied by the rotation pores of Aschner, Maruyama, and/or Kisa based on the inherency argument discussed above. (Office Action, Page 8).

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection as applied to Claim 7.

Regarding the limitation in base Claim 8 directed to "a plurality of vibration suppression pores", the Examiner states that this limitation is satisfied by the rotation pores of Aschner, Maruyama, and/or Kisa based on the inherency argument discussed above. (Office Action, Page 8).

As discussed above in Part I, the inherency argument is incorrect and therefore the rejection cannot be sustained.

Appellant requests reversal of this rejection as applied to Claim 8 and Claim 9 dependent therefrom.

Regarding further base Claims 7 and 8, it is also not seen that the cited art teaches or suggests the limitations therein directed to "the relative positioning and the directionality

associated with a particular pore type being unique to that said particular pore type with respect to others of said pore types", as it pertains to an arrangement involving floatation pores, rotational pores, and vibration suppression pores.

III. INDIVIDUAL GROUNDS FOR OBJECTION

Regarding the objection to Claim 3, Appellant submits that none of the cited art teaches or suggests the subject matter set forth therein.

Appellant requests reversal of this objection.

Regarding the objection to Claim 10, Appellant submits that none of the cited art teaches or suggests the subject matter set forth therein, specifically in regard to the recitation pertaining to auxiliary fine suppression pores.

Appellant requests reversal of this objection.

If the Examiner or Board has any questions or comments that would advance prosecution of this case, the Examiner or Board is invited to call the undersigned at 260/484-4526.

Respectfully submitted,

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RJK/jrw2

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450, on: September 1, 2004.

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APPENDIX OF CLAIMS UNDER APPEAL

Claim 1: A substrate body-floating apparatus for blowing an gas flow onto a rear surface of a substrate body to float and rotate the substrate body comprising:

a floating unit having a surface with a plurality of fine floating pores configured for floating the substrate body, a plurality of fine centering pores configured for centering the substrate body at a center of a substrate body-floating apparatus, a plurality of fine rotational pores configured for rotating the substrate body at a center of said apparatus, and a plurality of auxiliary fine suppression pores configured for suppressing vibration of the substrate body when the substrate body is rotated at a high speed, each pore type of said fine floating pores, said fine centering pores, said fine rotational pores, and said auxiliary fine suppression pores having a relative positioning and a directionality associated therewith, the relative positioning and the directionality of a particular pore type being unique to that said particular pore type with respect to others of said pore types, the relative positioning and the directionality associated with a given said pore type determining the direction of gas emission therethrough, wherein all pore types of said fine floating pores, said fine centering pores, said fine rotational pores, and said auxiliary fine suppression pores are provided on a surface of said floating unit and are inclined against the surface of said floating unit, each of said pores having an inclination associated therewith, an gas flow being injected into each of said pores in a direction of the inclination thereof.

Claim 3: The substrate body-floating apparatus according to claim 1 wherein a surface of said floating unit is divided into four quadrants, a plurality of said fine floating pores being provided in each quadrant, each said fine floating pores within a given one of said quadrants having a same floating pore direction as each of the other said fine floating pores located in said given one of said quadrants, said same floating pore direction being parallel to a diagonal line of said given one of said quadrants, said diagonal line being oriented to a center of said floating unit.

Claim 4: The substrate body-floating apparatus according to claim 1 wherein said plurality of fine centering pores configured for centering are located at positions that are one of on an outer periphery of the substrate body and on an outer side from the outer periphery, each said fine centering pores being angularly displaced, relative to a center of said floating unit, from each adjacent said fine centering pore, said plurality of fine centering pores each having a fine centering pore direction associated therewith, each said fine centering pore direction being oriented toward said center of said floating unit.

Claim 5: The substrate body-floating apparatus according to claim 1 wherein said plurality of fine rotational pores are located at positions on a circle with a radius smaller than the radius of the substrate body and centered around a center of a surface of said floating unit, said adjacent fine rotational pores being directed away from one another in substantially opposite directions, said substantially opposite directions being approximately tangential to said circle.

Claim 6: The substrate body-floating apparatus according to claim 1 where said plurality of auxiliary fine suppression pores each have an auxiliary fine suppression pore orientation

direction, each said auxiliary fine suppression pore orientation direction being directed oriented toward a center of said floating unit, each said auxiliary fine suppression pore being located on a periphery of a circle extending beyond the position of said plurality of fine rotational pores, said circle being concentric with a center of said floating unit, said auxiliary fine suppression pore orientations directions for a set of adjacent said auxiliary fine suppression pores being angled at 90 degrees relative to one another.

Claim 7: A substrate body-floating type of heater comprising:

a floating means for applying air to a rear surface of a substrate body to float, rotate and suppress vibration to the substrate body, said floating means including a plurality of floatation pores, a plurality of rotational pores, and a plurality of vibration suppression pores therein, said flotation pores, said rotational pores, and said vibration suppression pores being positioned and directed so as to promote one of floatation, rotation, and vibration suppression, respectively, via gas flow control, the relative positioning and the directionality associated with a particular pore type being unique to that said particular pore type with respect to others of said pore types; and

an optical lamp for heating a surface of the substrate body.

Claim 8: A substrate body-floating type of film-forming apparatus comprising:

a floating means for applying gas to a rear surface of a substrate body to float, rotate and suppress vibration to the substrate body under atmospheric or under depressurized conditions for forming a film of deposited material on a surface of the substrate body, said floating means including a plurality of floatation pores, a plurality of rotational pores, and a plurality of vibration

suppression pores therein, said floatation pores, said rotational pores, and said suppression pores each being positioned and directed so as to promote one of floatation, rotation, and vibration suppression, respectively, via gas flow control, the relative positioning and the directionality associated with a particular pore type being unique to that said particular pore type with respect to others of said pore types.

Claim 9: The substrate body-floating type of film-forming apparatus according to claim 8, further comprising a nozzle for blowing gas for film formation onto a surface of the substrate body, said nozzle having a nozzle internal diameter, said nozzle internal diameter and an external diameter of the substrate body are set to substantially the same values and a clearance between a tip of the nozzle for blowing the gas and a surface of the substrate body is set to 2 mm or less.

Claim 10: A substrate body-floating apparatus according to claim 1 wherein all of said auxiliary fine suppression pores are located outer of said centering pores and said rotational pores.